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GB 2021154 A US 4415358 A US 4392887 A

(58) Field of search
UK CL (Edition K) B8A A3AL A3AW, B8S SAE SAG SAH, F4B BGA
INT CL[5] B65D, B65G, C21C 7/04 7/06 7/064 7/068 7/072 7/076
Online databases: WPI

(54) **Flux injecting machines**

(57) A flux injecting machine (10) for purifying molten metal has a hopper (11), collecting head (12) and an injecting lance, has its head (12) as a one piece housing (20) defining a closed axial central bore (21) opening into a transverse bore (24) at its closed end. A venturi valve (35) and flow control valve (30) are provided in the bore (21) and the lance connects to one end of the transverse bore (24), a gas source being connected to the other end of the transverse bore at (49). The hopper (11) is coaxial with the central bore (21). Having the head (12) as a one piece housing (20) reduces the need for sealing rings.

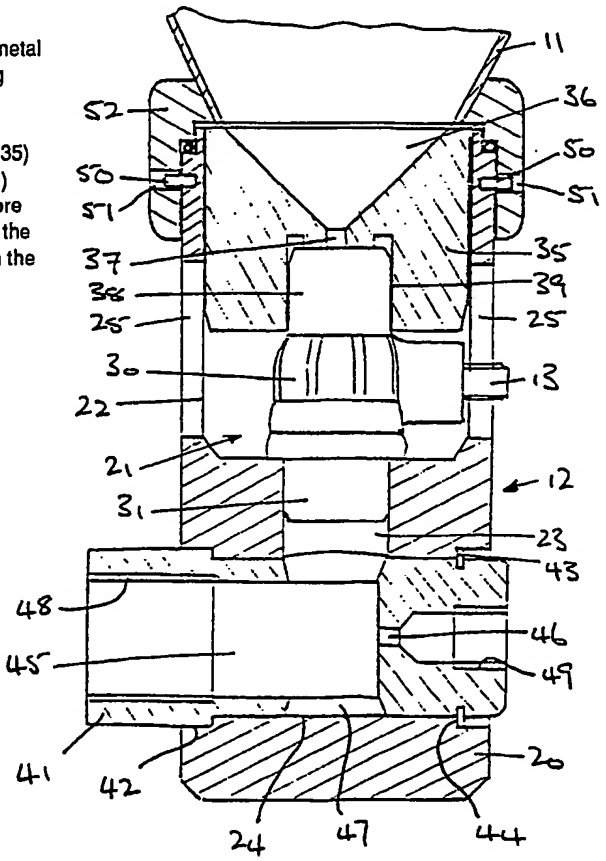

Fig. 2.

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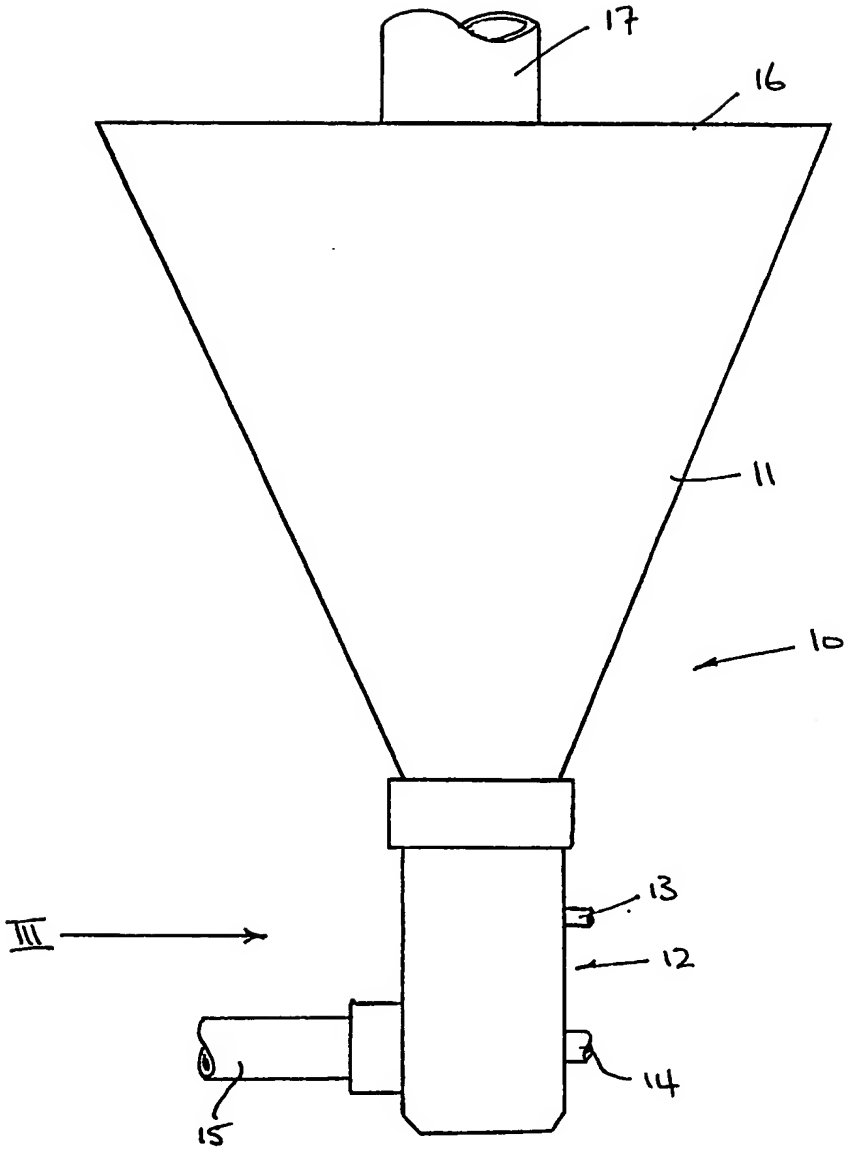

FIG. 1

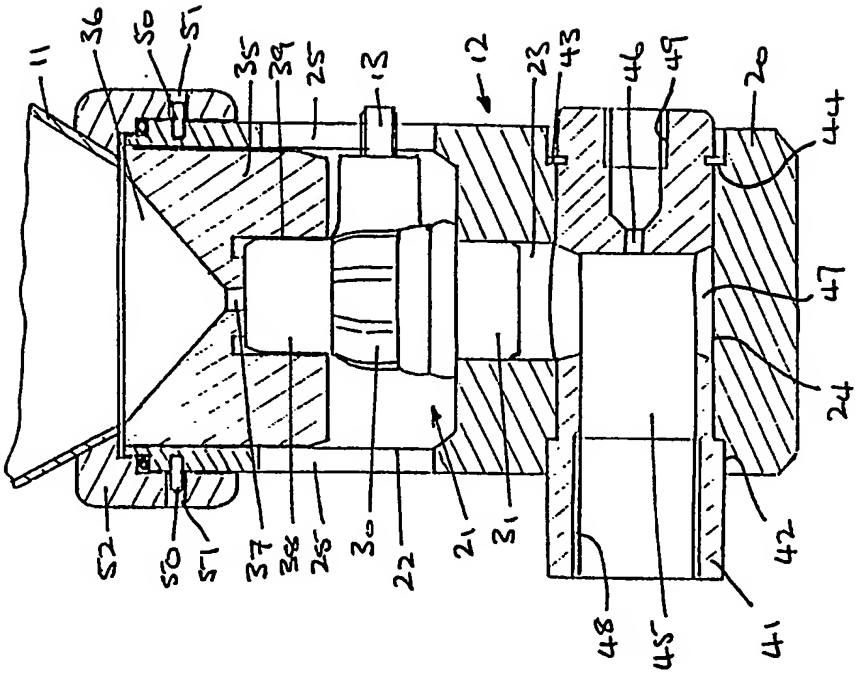
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FIG. 2.

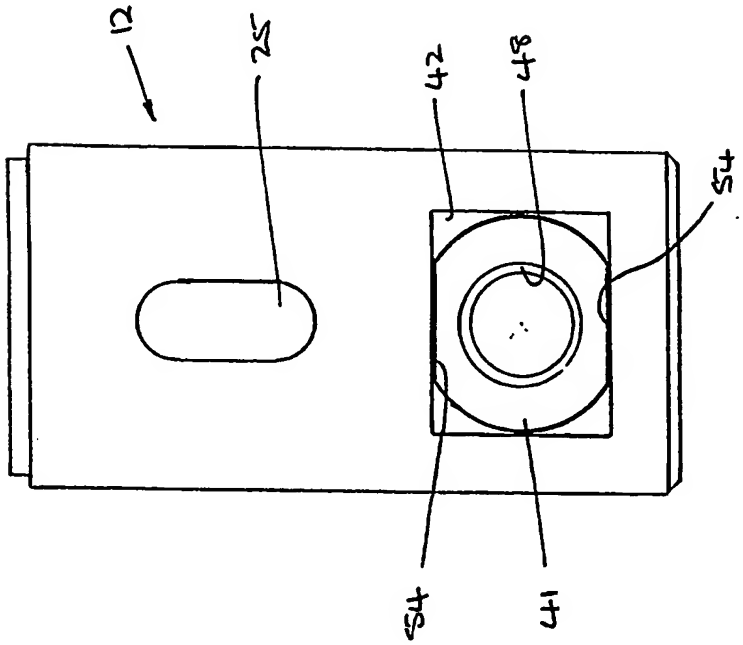
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FIG. 3.

FLUX INJECTING MACHINES

The present invention relates to flux injecting machines and in particular to machines for injecting flux into molten metals, so that the flux will act to remove impurities from the molten metal and at the same time improve the flow characteristics, thus reducing porosity of the finished castings.

According to one aspect of the present invention, a flux injecting machine comprises a hopper, a collecting head and an injecting lance, the collecting head comprising a one piece housing, the housing defining a closed axial bore, the axial bore opening into a transverse bore adjacent its closed end, a transverse aperture being provided through the housing to the central bore adjacent the open end, a venturi valve being located at the open end of the central bore and a flow control valve being located in the central bore between the venturi valve and the transverse bore, the flow control valve having a control spindle which is located through the transverse aperture, means being provided for connection to the injecting lance at one end of the transverse bore and means being provided for connection to a source of gas under pressure adjacent the other end of the transverse bore, the collecting head being adapted to be connected to the hopper coaxially of its central bore adjacent the open end thereof, so that flux will be delivered from the

hopper to the venturi valve.

With the flux injecting machine disclosed above, flux in powder form will be delivered from the hopper to the flow control valve and thence to the transverse bore where a jet of gas, for example nitrogen, will cause the flux powder to be propelled along the injecting lance into the molten metal. The flow control valve will control the rate of flow of powder to the injecting lance. If need be, the hopper may be pressurised, again using for example nitrogen gas, in order to ensure that the flux powder is delivered to the venturi valve.

Assembly of the collecting head into a one piece housing, minimises the leakage paths, thereby reducing the need for sealing rings to prevent leakage or blow back of the flux powder.

An embodiment of the invention is now described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a side elevation of a flux injecting machine in accordance with the present invention;

Figure 2 is a part sectional side elevation of the collecting head of the flux injecting machine shown in Figure 1; and

Figure 3 is an elevation in the direction of Arrow III in Figure 1.

As illustrated in Figure 1, a flux injecting machine 10 comprises a hopper 11 made, for example, from a one piece spun, drawn or formed component of generally conical configuration. A collecting head 12 which is described in greater detail below with reference to Figures 2 and 3, is attached to the lower smaller diameter end of the hopper 11. The collecting head 12 has an inlet 14 for nitrogen gas and a tubular injecting lance 15 is connected adjacent the end remote from the hopper 11. The hopper 11 has a lid 16 which may be bolted to the larger diameter upper end with sealing means therebetween. An inlet 17 is provided through the lid 16 by which the hopper 11 may be loaded with flux powder and an inlet (not shown) may be provided by which nitrogen gas may be introduced into the hopper 11 to prevent clogging of the flux powder therein. The inside walls of the hopper 11 are coated with plastics material, for example polyurethane, in order to prevent corrosion by the caustic flux powder and to reduce friction.

As illustrated in Figures 2 and 3, the collecting head 12 comprises a housing 20 moulded in one piece from plastics material. The housing 20 has a central closed bore 21. The central bore 21 is stepped having a large diameter portion 22 at its open end and a reduced diameter portion

23 at its closed end. The reduced diameter portion 23 opens into a transverse bore 24.

A pair of elongate diametrically opposed apertures 25 open into the large diameter portion 22 of bore 21. A flow control valve 30, for example a ball valve, is located in the large diameter portion 22 of bore 21, a spigot formation 31 on the flow control valve 30 sealingly engaging in the reduced diameter portion 23 of bore 21. The flow control valve 30 has a valve element, for example a ball, controlled by a spindle 13 which extends through one of the apertures 25. The open end of bore 21 is closed by a venturi valve 35 defining a conical passage 36 which reduces in diameter to a metering orifice 37, adjacent the flow control valve 30. A spigot formation 38 on flow control valve 30 at the end axially opposite to spigot formation 31, sealingly engages in a bore 39 in the venturi valve 35.

A plug 40 with head formation 41 adjacent one end is located through the transverse bore 24. A pair of parallel flats 54 on the head formation 41 engage corresponding walls of a recess 42 formed on the outside of housing 20, to locate the plug 40 rotationally with respect to the housing 20, a circlip 43 locating on the other end of plug 40 against shoulder 44 of the housing 20, to locate the plug 40 axially. The plug 40 has an axial stepped bore 45 defining a reduced diameter orifice

46 adjacent the end remote from the head formation 41. Transverse apertures 47 are provided in the plug 40 between the orifice 46 and the end of plug 40 defined by the head formation 41, said apertures 47 corresponding to the reduced diameter portion 23 of bore 21. A screw connection 48 for the injecting lance 15 is provided at the end of plug 40 defined by the head formation 41 and a gas connection 49 is provided adjacent the other end of plug 40.

A series of pins 50 extend radially outwardly from the end of the housing 20 adjacent the hopper 11 and engage in L-shaped slots 51 in a collar 52 which is secured to the hopper 11, to provide a bayonet connection. An elastomeric O-ring 53 is provided between shoulder portions on the collar 51 and end of housing 20, to provide a seal therebetween and to resiliently load the bayonet connection.

In order to assemble the collecting head 12, the flow control valve 30 is first introduced into the larger diameter portion 22 of bore 21. The apertures 25 are dimensioned to allow the control spindle 13 of flow control valve 30 to be first introduced through the aperture 25, the flow control valve 30 being tilted with respect to the axis of bore 21 for this purpose. The flow control valve 30 may then be manipulated around until it is coaxial with the bore 21 and the spigot

formation 31 may be pressed into portion 23 of bore 21. The venturi valve 35 may then be pressed into the open end of bore 21 to engage spigot formation 38 on the flow control valve 30. The plug 40 may then be located through the bore 24 and clipped in position by circlip 43.

The housing of the present invention is of symmetrical configuration, having apertures 25 on either side of the central bore 21 and recesses 42 at each end of the bore 24. The flow control valve 30 and plug 40 may consequently be located with respect to the housing 20 at positions spaced angularly at 180° thereby permitting flexibility in the positioning of the control spindle 13, gas inlet 14 and injecting lance 15.

In operation, flux powder is delivered from the hopper 11 through the venturi valve 35 and metering orifice 37 to the flow control valve 30, where the rate of flow is controlled. The powder then flows out of flow control valve 30 through portion 23 of bore 21 and aperture 47 into the bore 45 of plug 40. A jet of nitrogen passing through orifice 46 then forces the flux powder along the injecting lance 15 into the molten metal.

CLAIMS

1. A flux injecting machine comprising a hopper, a collecting head and an injecting lance, the collecting head comprising a one piece housing, the housing defining a closed axial bore, the axial bore opening into a transverse bore adjacent its closed end, a transverse aperture being provided through the housing to the central bore adjacent the open end, a venturi valve being located at the open end of the central bore and a flow control valve being located in the central bore between the venturi valve and the transverse bore, the flow control valve having a control spindle which is located through the transverse aperture, means being provided for connection to the injecting lance at one end of the transverse bore and means being provided for connection to a source of gas under pressure adjacent the other end of the transverse bore, the collecting head being adapted to be connected to the hopper coaxially of its central bore adjacent the open end thereof, so that flux will be delivered from the hopper to the venturi valve.

2. A flux injecting machine according to Claim 1 in which the housing of the collecting head is moulded from plastics material.

3. A flux injecting machine according to Claim 1 or 2 in which the axial bore of the housing and the transverse

aperture are sized relative to the flow control valve to permit the control spindle of the flow control valve to be first introduced through the aperture as the flow control valve is manipulated into the axial bore of the housing.

4. A flux injecting machine according to any one of Claims 1 to 3 in which the axial bore in the housing of the collecting head is stepped, a portion of the axial bore adjacent the closed end being of reduced diameter, the flow control valve having a first spigot formation which sealingly engages in the reduced diameter portion of the axial bore.

5. A flux injecting machine according to Claim 4 in which the flow control valve has a second spigot formation formed coaxially of the first spigot formation at the opposite end of the flow control valve, the second spigot formation sealingly engaging in a bore in the venturi valve.

6. A flux injecting machine according to any one of the preceding claims in which a plug locates through the transverse bore, said plug having an axial bore with a transverse aperture which is aligned with the axial bore of the housing, one end of the plug being adapted to be connected to the injecting lance and the other end of the plug being adapted to be connected to a source of gas

under pressure.

7. A flux injecting machine according to Claim 6 in which the plug has a head formation with flats for engagement against corresponding flats on the housing of the collecting head for locating the plug rotationally with respect to the housing, means also being provided to locate the plug axially with respect to the transverse bore.

8. A flux injecting machine according to any one of the preceding claims in which a bayonet connection is provided between the collecting head and the hopper.

9. A flux injecting machine substantially as described herein, with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under Section 17 (The Search Report)

Application number
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Relevant Technical fields

(i) UK Cl (Edition K) B8S (SAE,SAG,SAH), B8A (A3AL, A3AW)

(ii) Int CL (Edition 5) B65G B65D

Search Examiner
D C CROUCH

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
29 AUGUST 1991

Documents considered relevant following a search in respect of claims 1-9

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB 2021152 (DUPORT)	1
A	US 4415358 (ARBEDI)	1
A	US 4392887 (GOEDERT)	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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